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ABSTRACT

This study explores beginning elementary teachers' instructional computer use, with emphasis on the ways in which these teachers use the computer, influences on these uses, and the impact of these uses on their teaching and socialization into the profession. A qualitative case study research design, drawing on ethnographic methods, was used to examine six beginning elementary teachers, all women, who were teaching in grades two, four, and five. Data were collected through in-depth focused interviews, classroom observations, informal interviews, and daily logs maintained by each teacher. Results revealed that beginning teachers spend their early teaching experiences struggling to survive as they settle into their role as teacher. Computer usage was not emphasized because the teachers viewed computers as "extra" and "special," not as tools to enhance the instructional process. As teachers gained confidence and experience, their use of the computer evolved to include many classroom activities; however, they continued to feel constrained by the time required to plan for microcomputer use, select software, and cope with individual student needs. It is recommended that teacher preparation programs include an introduction to computers, their operation, and potential uses in the classroom, and that field experiences in using computers for instructional purposes be engaged in frequently. (23 references) (DB)

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BEGINNING ELEMENTARY TEACHERS' USE OF THE COMPUTER IN CLASSROOM INSTRUCTION

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BEGINNING ELEMENTARY TEACHERS' USE OF COMPUTERS IN CLASSROOM INSTRUCTION

Becoming a teacher is a complex process. It is a process which is influenced by many factors, including examples of former teachers, preservice teacher preparation, and the actual experience and context of teaching. Beginning teachers embark on their first teaching assignments with a great deal of knowledge and experience upon which to draw as they make the transition from being a student to being a teacher. As they enter their professional roles, these teachers are faced with many challenges and decisions. Traditionally, they have been confronted with decisions about their day-to-day instruction, such as the objectives they seek to achieve and the methods they will use to achieve them. Beginning teachers have also typically been met with challenges posed by classroom discipline, student differences, and parental interactions.

Recently, a new challenge has been placed in the classroom -- the computer. Most teachers, even those just beginning their careers, completed their own education before computers were commonly found in the classroom or linked to the processes of teaching and learning. This leaves them with little experience or knowledge upon which to base their use of the computer in their classroom instruction. Yet, these teachers are often placed in classrooms where computers are readily available -- although usually not in sufficient numbers -- and where they are expected or required to use them. These expectations, along with the mere presence of the computer in the classroom, can add to the complexity of teaching. Attempts to use the computer in classroom instruction can intensify the careful balancing act which beginning teachers often perform as they develop in their professional roles as classroom teachers.

Currently, little is known about computer use among beginning teachers. The study described in this paper explored beginning elementary teachers' instructional computer use, specifically the ways in which they used the computer, the influences on these uses, and the impact of these uses on their teaching and socialization into the profession. In the following pages, the pertinent literature is briefly reviewed, the methodology of the study is described, and the findings and implications are discussed.

Perspectives: Socialization Influences and Computer Usage

Understanding computer use by beginning teachers requires an understanding of two complex processes: becoming a teacher and incorporating the computer into classroom instruction. There are a variety of factors commonly identified in the literature as important influences on these two separate yet related processes. We briefly describe some of these influences.

There is increasing evidence to suggest that beginning teachers are socialized into the profession through an interactive process which is influenced both by their preconceptions of teaching and by the contexts of their beginning teaching situations (Bullough, 1989; Crow, 1987; Knowles, 1989; Lacey, 1977; Zeichner & Tabachnick, 1985). Preconceptions about teaching develop as individuals serve an "apprenticeship of observation" (Lortie, 1975) during their many years as students. Throughout their K-12 and university experiences, prospective teachers spend countless hours in classrooms and observing teachers. These experiences prompt the internalization of models of what it means to be a teacher. Beginning teachers often use these models as a means of developing expectations for themselves as teachers and as source of ideas for teaching practices (Bullough, 1989; Crow, 1987; Feiman-Nemser & Buchmann, 1983; Knowles, 1989; Lortie, 1975; Petty & Hogben, 1980).

Beginning teaching practices are also influenced by the contexts of teaching situations. During the early parts of their initial teaching assignments, beginning teachers often suffer "transition shock" (Corcoran, 1981) as they realize that their preconceptions about teaching differ from the realities of the classroom (Ryan, 1986). They, for instance, are surprised at the amount of time which teaching requires and are overwhelmed by all that they need to do. Although they have spent many hours in classrooms, they are now on the other side of the teacher's desk and in a new school. Consequently, beginning teachers often struggle to survive as they become comfortable with the content they are required to teach, with the materials and resources available to them, and with the rapid and complex nature of classroom teaching.

As beginning teachers attempt to deal with the complexities of teaching they are highly affected by the context of their classrooms, such as its rapid, multidimensional, simultaneous, and unpredictable nature (Doyle, 1979). Students are one aspect of the classroom which have been identified as having a powerful influence on teachers' instructional decisions and behaviors, such as the types of teaching materials and methods which are selected and used (Doyle, 1979; Haller, 1967; Hoy, 1967, 1968, 1969; Pollard, 1982).

As beginning teachers become comfortable with their new role, they gain control of their classrooms and develop a teaching routine. This routine is often based on the use of specific teaching strategies and tools, and may well impact their teaching style for the remainder of their teaching career (Bullough, 1989; Ryan, 1986; Veenman, 1984).

A relatively recent addition to traditional classroom resources is the computer. Use of this resource is often affected by factors internal as well as external to the teacher. External influences include grade level (Becker, 1986a, 1986b; Foliart & Lemlech, 1989; Wiske & Zodhiates, 1987), and student composition, that is, ability levels and minority students' representation, (Becker, 1986a, 1986b; Winkler & Shavelson, 1983). Computer use in elementary classrooms, as well as classrooms with low ability and high minority enrollments, most often occurs as a drill and practice activity designed to reinforce basic academic skills. Internal factors include teachers' knowledge and understanding of computer software and their personal beliefs about the computer (Winkler & Shavelson, 1983; Wiske & Zodhiates, 1987). Teachers who believe the computer has the potential to enhance the processes of teaching and learning, and teachers who are familiar with instructional software are more likely to include the computer in their instruction.

Given that beginning teachers face many challenges as they embark on their careers and that the computer may add additional challenges to the teaching situation, and the dearth of research which specifically deals with teachers instructional use of the computer, let alone the practices of beginning teachers, this study examined the interaction of beginning teaching experiences and the incorporation of the computer into classroom instruction.

Method: A Qualitative Framework

A qualitative case study research design, drawing on ethnographic methods, was used to explore and describe beginning teachers and their use of computers in classroom instruction. This approach allowed the complexity of the classroom context to be examined and the perspective of the beginning teachers to be obtained.

Selection of Informants

Numerous school districts in southeastern Michigan were contacted and asked to identify first-year elementary teachers who used computers in their classroom instruction. These were teachers who had not previously held full-time teaching positions other than as substitute teachers, and were recognized by their administrators as making regular use of the computer -- some of the principals even regarded these individuals as "expert" computer users. Many of the districts did not have any first-year teachers; others had first-year teachers but they were not using computers. Ultimately, three different middle-class districts were represented in the study. Two of the districts were relatively small (approximately 4,000 students and 200 teachers); one of these districts was financially well-established, the other was facing extreme budget difficulties. The third district was larger (approximately 16,000 students and 700 teachers). None of the districts had strict computer requirements for students or teachers, although each "encouraged" computer use and provided an Apple II computer in each classroom along with an adequate supply of instructional software.

Six beginning elementary teachers, recommended by district and school administrators, were selected as the informants. These teachers were all women, ranged in age from 23 to 42, and taught in grades two, four, and five. No male teachers were identified as meeting the criteria. Four of the teachers were second-career teachers and two of them took the more traditional path to their first teaching position. They represented a wide range of computer knowledge and expertise, from vast exposure to a variety of computers in the business setting, to a brief introduction to one computer in a classroom environment. These teachers were studied during the second semester of their first year of teaching. This allowed them time to begin to settle into their professional role and

get beyond merely surviving in the classroom, a stage usually over by the end of November -- or February at the latest (Ryan, 1986).

Data Collection and Analysis

The data was collected using various procedures, including: in-depth focussed interviews, classroom observations, informal interviews, and written documents, namely daily logs maintained by the teachers. Initially, an in-depth interview was conducted with each teacher to develop a sense of her background, beliefs, and experiences. These interviews were conducted in February 1990, and although they were "focussed," there were many opportunities for open-ended discussions. Much of this first interview investigated the teachers' experiences throughout their first year of teaching. At the end of the interviews, the teachers were asked to maintain written logs for a two-week period. The structure for the log entries was provided to them, focussing on their uses of the computer and their reflections about these uses, as well as their reflections about teaching in general.

The interviews were audio recorded and immediately transcribed. Using a constant comparative method of analysis as described by Glaser and Strauss (1967), initial analyses were made, questions generated, and interpretations developed. Questions which emerged from this initial analysis were explored through informal discussions with the teachers, and themes were verified through classroom observations. The observations were conducted throughout March, April, and May. Each teacher was observed on at least four different days -- scheduled at her convenience. These observations provided opportunities to actually see the teachers in action, both when they were using the computer and when they were not. The analysis of the observation data identified new themes and also verified existing ones. Near the end of the observations, composite profiles of the teachers were written based on the data which had been collected and analyzed. These profiles were intended to provide insight into the individual characteristics of each teacher, to describe a typical day of teaching for her, and to highlight the ways she used computers and the influences on these uses. The composite profiles were shared with the teachers and they were asked to corroborate the findings revealed in them.

Follow-up interviews were held in June to discuss the composite profiles and resolve any unanswered questions. This final interview was informal and allowed the teachers to share their reflections about the development of their professional roles as well as about their use of the computer during the year. Overall, the teachers felt the profiles captured their essence and agreed with the findings that were presented to them. The creation of the composite profiles provided a means of developing a clear understanding of the individual teachers and a surface understanding of the themes which they shared. Additional analysis was conducted after the final interviews to make further comparisons among the teachers, and to identify and verify categories or themes which they shared.

The constant comparative method of analysis was used throughout the data analysis process. This method is particularly useful in identifying differences and patterns in the data; it is less useful in identifying the amount of differences in the patterns. That is, the ways in which these teachers adjusted to the role of the teacher along with the ways they used the computer in instruction were identified; the effectiveness of their computer use or teaching abilities, however, was not examined.

Findings: Patterns of Computer Use

The beginning teachers in this study were probably "typical" first-year teachers. They passed through stages commonly associated with beginning teaching, and experienced concerns and doubts traditionally related to entry into the teaching profession. When interviewed in February, for example, they felt the early weeks of the school year were characterized by "surviving," and now it was more characterized by "planning." Overall, these teachers felt this first-year of teaching was "exciting, hectic, rewarding, challenging, time consuming, and tiring." During their early days in the classroom, they were surprised by and overwhelmed at the amount of time their teaching responsibilities demanded:

> I didn't realize that teaching is this time consuming -- that there is so much to do. I am talking not only about the seven or eight subjects that I have to teach and prepare

for, but also I have meetings to go to and committees to be on, the evaluations, the workshops, the notes from parents. Maybe I heard about that in college but it never sunk in until now. Nobody really told me what a hard job being a teacher is. I never thought it would be like this -- I love it, don't get me wrong, but it's very hard.

The early teaching experiences for these teachers were characterized by a struggle to survive and make it through each day while attending to their responsibilities, including planning lessons, preparing materials, grading papers, and attending meetings. Due to the time required by these tasks, the teachers felt they had little time to work with individual students, pursue outside interests, or worry about using the computer. Although they wanted to use the computer, and believed it was important to do so, they also felt that there were too many things which they *had* to do before they could concentrate on extras, like the computer. They clearly viewed the computer as something extra to be included in the curriculum and something "special" to be scheduled into the school day; they felt they needed to "stress the academics" before they could add "extras" such as the computer. They did not view the computer as a tool which could be used to enhance the instructional process, and their early uses reflected these feelings.

Influences on Early Computer Use

At first, they instructed their students on the basics of operating the computer and using the keyboard. This was often followed by the students taking turns at the classroom computer to complete a keyboard drill, reflecting their view of the computer as an extra activity as well as their styles of teaching. They felt most comfortable when they were standing in front of the room and the students were working independently at their desks, and consequently taught whole class "computer lessons" followed by independent practice activities similar to the way the taught math or science lessons. They were often distracted by students working at the computer while other activities occured in the classroom:

It can be so distracting for me, and for the other kids, when I have to spend so much time answering computer questions. I do a lot of cooperative groups in

science, and I thought, at one time, of putting one cooperative group on the computer to analyze lever problems. But, I vetoed it because I didn't think that I would be able to handle their questions with the program and get them on it and explain it first to her, and then her....

The teachers were motivated to use the computer during their early months in the classroom because the students wanted to use it, the parents and administrators expected them to use it, and they had strong personal feelings that students needed exposure to this tool:

I use it because the students want to use it, they expect to use it, and they really enjoy using it. I feel it will be an integral part of their lives very soon and they need to know how to do the basics. Word processing will be the wave of writing in the future.

Although they used the computer with their students, they felt constrained by limited computer equipment, often commenting that it was a tedious, slow, and time consuming process to use one computer with a classroom of students:

I have them do a word processing type project and that takes a long time because first they write it and then they put it on the computer, and when I have 30 students doing that it takes a long time with one computer. Then I print it and pass it back. I have them physically edit so they can see their errors, then I have them go back and edit it on the computer. So that is another whole 30 kids going through that again, edit, then save it, print it and then they illustrate it. So that takes a lot of time.

I feel very limited in what I can do with it by the time I have, one computer, and the number of students. Although it is an easy way to teach writing, I am limited by the lack of hardware. For example, a word processing assignment might take two weeks for everyone to complete it. Because of that I can't do as much.

I need more computers. Word processing student written paragraphs is a slow process with only one computer. One is not enough for 28 students.

Their concerns about using one computer with a classroom of students reflected their "workbook mentality" of computer integration. That is, they viewed the computer in a manner similar to a workbook -- each student needed individual access to use it effectively. They did not perceive the computer as an instructional tool akin to an overhead projector or chalkboard which could be used effectively with the whole class at one time.

Influences on Later Computer Use

As they gained confidence and became more comfortable in the role of the teacher, their use of the computer evolved to include other activities, although they generally maintained the "workbook" view of it. As the school year progressed well into the second semester, use of the computer evolved to include word processing, drill and practice activities, and Logo programming. Five of the six teachers regularly used word processing in their classrooms as a way for students to produce the final drafts of their creative writing. The students took turns at the classroom computer during writing, language arts, or recess. This use of the computer was closely related to the teachers' personal beliefs. They, for instance, viewed the computer as an integral and important part of society and felt it was vital for their students to be able to use it in order to ensure their successes in future academic and career endeavors. They also believed that the computer freed up the writing process for their students, particularly their "writing disabled" students; and it motivated students to write:

> I think the neatest thing that I saw, was my slower kids being able to get an end result, rather than being bogged down with the penmanship and the spelling -- they could see their mistake and correct it with ease. And that just seemed to turn them on.

> I have seen a lot of improvement in their writing. They have been able to do a whole paragraph, at least a couple of them. I have seen a lot more free flow of their thoughts because they don't have to worry about their spelling or their handwriting or that this is going to take them forever.

All of the teachers used the computer as a way to provide reinforcement in specific academic skills because it allowed them to individualize instruction. Each of the teachers had access to a large collection of software, and they typically selected drill and practice programs with a game-like aspect to them to provide reinforcement for individuals, groups, or the whole class:

> It is real nice, as a teacher, having that material there that I know I can have the kids go to and they can work on it and get the extra practice. With spelling, I have a couple of kids who just don't do well on their spelling tests, so during the week I try to get them to work on [a spelling program]. That makes it different than just looking at the word and trying to memorize it. There has been a couple of times during math when I have had a sign-up sheet and everyone has had to go for ten or fifteen minutes and work with the drill and practice. That was just with the multiplication facts. A lot of times I will just assign certain kids to work on the computer, like at lunch.

> A lot of times I have my slower students work on math skills to get them to review their multiplication because we are now on division. I have at least three kids now who rotate on the multiplication game -- that works very well. And then I have my gifted student who sleeps during my science lectures, so I get him to play the levers program, or whatever unit we are on.

The students used the drill and practice programs selected by their teachers when they completed their work, at recess, or during scheduled computer times. The teachers said they used the computer in this fashion to provide the students with needed practice and reinforcement, because it allowed the students to become comfortable with the computer and still be learning, and because the students liked it -- "the computer made learning more fun:"

> The kids want to use it. They really like to use it -- they ask about it. I like to see that -- if they enjoy it and are motivated then I know I should make use of it. And I do use it. They practice things like math skills -- right now they are doing

multiplication and division and so I have some of them practice on the computer.

And, of course, fun, yes, mostly fun....

There was little evidence, however, that the teachers selected programs which provided *relevant* practice for the students. Many of the programs they used demonstrated weak instructional design and were only remotely related to the existing curriculum. And, most of the programs provided practice in skills which the majority of the students had already mastered.

General Influences on Computer Use

Besides their personal beliefs and desire to allow students to have fun, there were other factors which influenced the teachers' use of the computer, both motivating and constraining its use. Overwhelmingly, the teachers felt constrained by time -- time to plan for the computer; time to identify, locate, and preview software; and time to allow the students to use the computer during the school day. Time, however, was a major concern for these teachers in general -- time to plan, time to spend with individual students, and time for themselves:

I'd like to do more [with the computer]. I just don't have the time. Time to go through the software and see what goes with what I am doing. Time to coordinate the software to my curriculum. Time to research the software before I spend my own money, and I'm not about to use something that the [school] board hasn't already approved and that I hadn't previewed.

I would have the time during my teaching to use it, I just don't have the personal time that I need to preview it.

These teachers also felt that using the computer added to their existing classroom management problems. In general, they had difficulties establishing classroom routines and organizational systems, and dealing with the management aspects of teaching. It was difficult to schedule computer activities into an already crowded curriculum, and to use the computer in ways which were not distracting. The second-career teachers, however, felt somewhat better prepared to deal with some of the management tasks because they were used to juggling many things at once:

> Running a classroom is like running a small business and it took me a while to figure that out. I am used to managing 50 things at once from my previous work and you have to do that in a classroom.

In summary, computer use by the beginning teachers in this study was influenced by a variety of factors. Most notably, it was impacted by their first-year status. They felt they had other things to stress, such as "the academics," and had little time to use the computer because they were too busy dealing with their other responsibilities and getting comfortable in their new role. Student desires to use the computer, however, along with the teachers' strong personal beliefs in the importance of developing computer skills in their students, prompted them to use it. They were constrained in their use though by a lack of computer equipment and unfamiliarity with available software.

Implications: Issues for Teacher Education and Induction

The findings of this study reinforce the notion that the process of becoming a teacher is indeed very complex. The emergence of new teaching methods and materials, such as the computer, adds to this complexity. Given that beginning teachers are going to have these tools available to them -- be it individual computers or classroom sets -- then they need instruction in and support for the use of these tools in their classroom instruction.

Specifically, teacher preparation programs should include an introduction to the computer, its operation, and potential uses in the classroom. Field experiences with computers -- actively using them for instructional purposes -- which are theory-based, practical and realistic, and opportunities for substantially enhancing practice are sorely needed. If computers are to be brought more forcefully into the realms of classroom instruction then more focused and substantial experiences within teacher education is essential. Further, teacher educators will do well to model the use of computers in instruction so as to provide realistic examples from which these future teachers can later build.

School districts must go beyond simply providing hardware and software to teachers; they must also provide extensive support for using these materials in classroom contexts. This is particularly important for beginning teachers who need support and assistance with establishing the general procedures and responsibilities of teaching, as well as with materials with which they may not be familiar, such as the computer. Beginning teachers also need time -- time to learn the craft of teaching, to become comfortable with their new surroundings, to plan their instruction, to organize their classrooms, and to reflect on their professional development in a general sense as well as related to computer use.

Beginning teachers typically spend a great deal of time reviewing the content they must teach and planning ways to teach it. Although the computer can serve as an alternative teaching method for some content areas, beginning teachers' need extra help in developing teaching skills using it because of their lack of experience with the computer during their own educational experiences. They have few examples of exemplary computer instruction -- if any -- upon which to draw. These teachers need practical hints and guidance related to integrating computer technology into classroom instruction, such as help in identifying and evaluating software and matching it to their curricular objectives. They also require help in the classroom management aspects of the computer, such as scheduling computer time, setting up and organizing computer materials and equipment, and especially techniques for using one computer with a classroom of students.

Beginning teaching experiences play a critical role in the professional development of teachers -- they help to shape teachers' ultimate teaching styles. The computer provides opportunities for beginning teachers to teach in new and innovative ways and to develop styles which are different from those used by their former teachers -- styles that are unique to them. Further investigation of this interaction between beginning teachers and computers is necessary so that we can better understand and consequently assist beginning teachers to deal with the many challenges with which they are faced, including the computer.

That these beginning teachers -- regarded by their principals as having particular expertise or making innovative use of the computer -- were only able to utilize the computer in somewhat limited ways, was disappointing, although not unexpected given the present contexts that most first-year teachers face when they enter the profession. Computer technology will indeed be limited in its effective classroom practice unless the contexts which hinder the use of it are modified. This is especially so since the early years of teaching play an important part in the development of career-long patterns and habits of teaching -- and are often difficult to overcome. However, the contexts described in this study, more generally, highlight the plight of all beginning teachers; they are expected to function under conditions that do not allow for the optimal development of their instructional practices, a fact that ultimately must hurt the quality of education that the Nation's children receive.

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